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Schlaudecker

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[54] **BOTTLE AND CAP CLOSURE SYSTEM**

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[73] Assignee: **Merck & Co., Inc.,** Rahway, N.J.

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[51] **Int. Cl.**[4] **B65D 41/34**

[52] **U.S. Cl.** **215/32;** 215/226; 215/251; 215/256; 220/270

[58] **Field of Search** 215/256, 251, 226, 32; 220/257, 258, 256, 270

[56] **References Cited**

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Attorney, Agent, or Firm—Salvatore C. Mitri; Joseph F. DiPrima

[57] **ABSTRACT**

There is disclosed a novel bottle and cap closure system for dropper bottles and the like which comprises a set of lugs or cams and a snap bead provided in the cap and a set of lugs or cams provided on the neck portion of the bottle. After the bottle is filled, the cap is secured to the bottle by having the snap bead on the cap engage the lugs or cams on the bottle. The snap bead in the cap is carried on the circumferential lower edge of a tear-away band. After the tear-away band is removed to use the contents of the bottle, the cap is re-secured to the bottle by engaging the lugs or cams in the cap to the lugs or cams on the bottle.

8 Claims, 2 Drawing Sheets

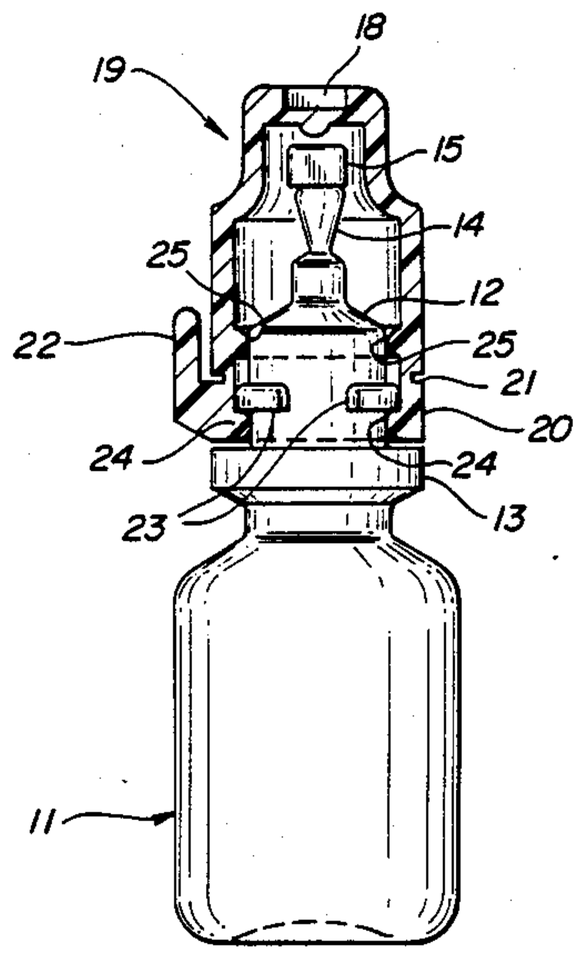
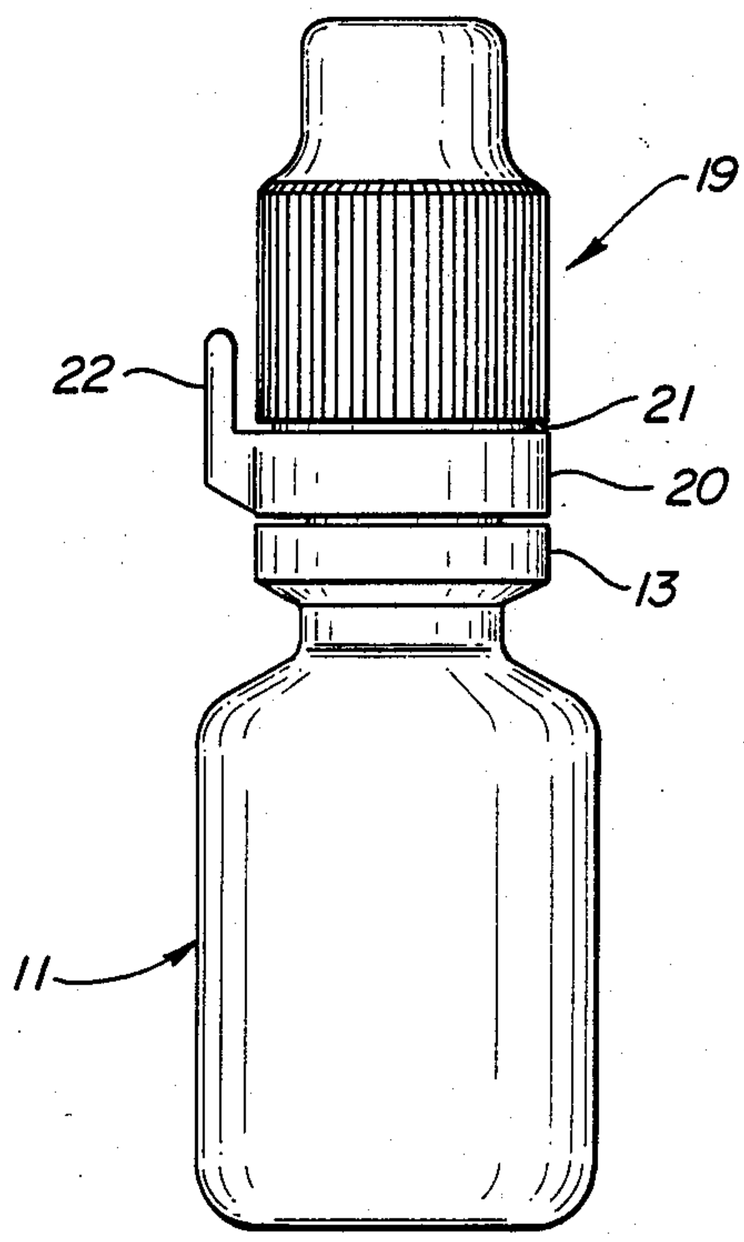


FIG-1



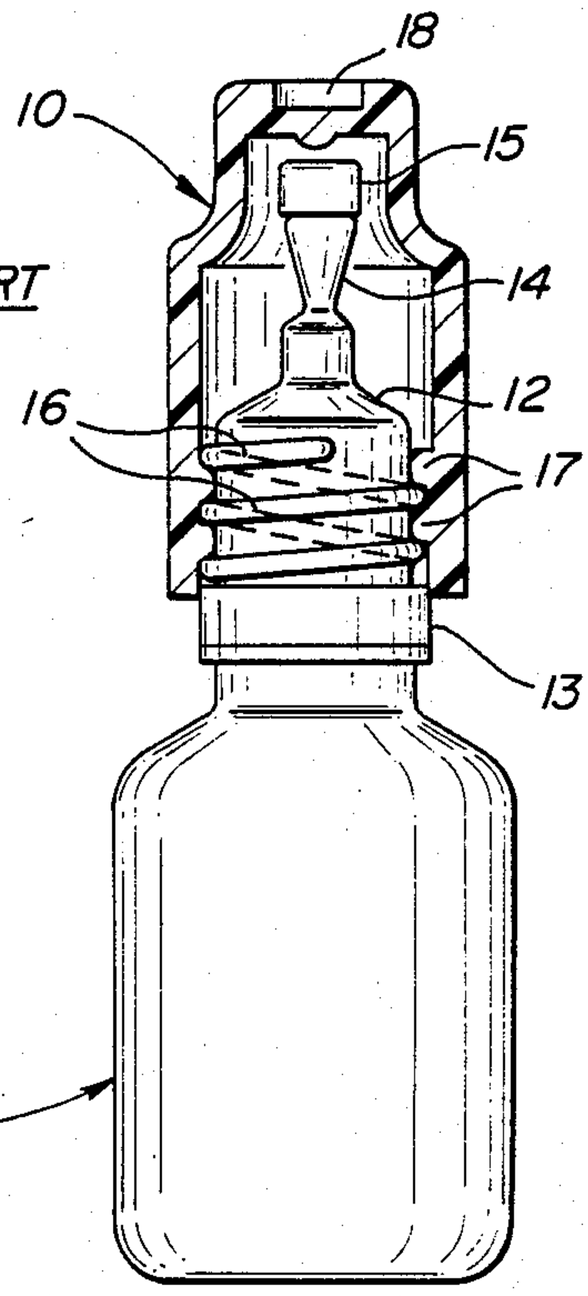


FIG-2 PRIOR ART

FIG-3

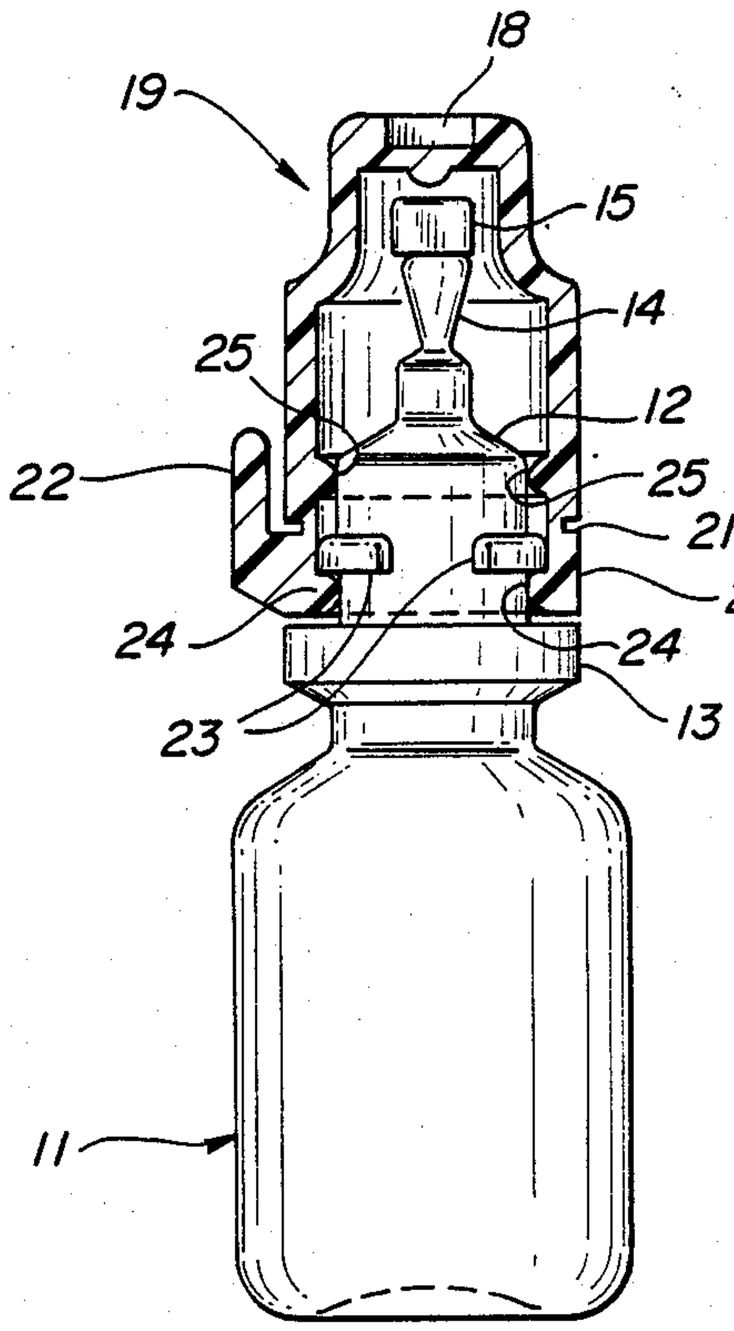

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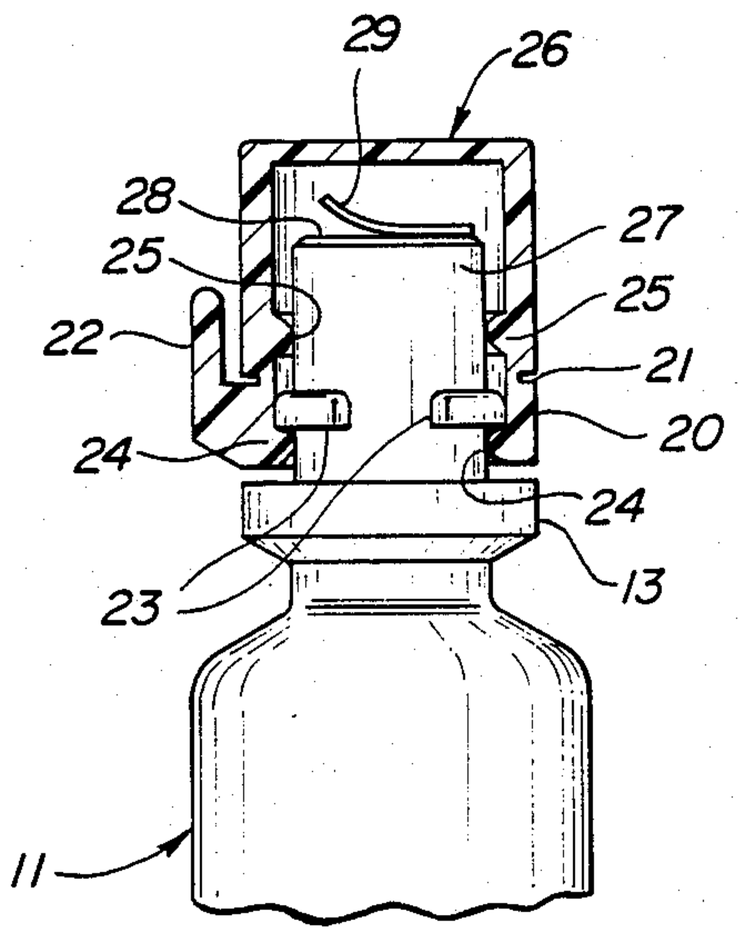
FIG-4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BOTTLE AND CAP CLOSURE SYSTEM

BACKGROUND OF THE INVENTION

This invention is directed toward a novel bottle and cap closure system which is particularly well suited for use with dropper type bottles.

Many dropper type bottles presently in commercial use have an elongated tip portion that terminates with a break off tab seal. Thus, after the bottle has been filled and the break off tab seal has been applied, the contents of the bottle can not spill out nor can the contents of the bottle be contaminated by the atmosphere. Non-contamination of the bottle contents is an important consideration, particularly when the contents of the bottle is a medication which must be kept sterile until use. The break off tab seal is protected by securing a cap to the bottle to complete closure of the bottle. Typically, the cap is secured to the bottle by means of threads provided in the cap and on the neck of the bottle so that the cap is screwed onto the bottle.

These dropper-type bottles are generally filled, the break off tab seal applied and the cap screwed onto the bottle in assembly-line fashion. Under these condidtions, a cap applying apparatus is used to screw the cap onto the bottle. If the torque of the cap applying apparatus is not closely controlled and frequently monitored, the cap can be secured too loosely or too tightly. If secured too loosely, the cap can fall off during subsequent handling and shipping exposing the break off tab seal to premature removal thereby subjecting the contents of the bottle to spillage and contamination. If secured too tightly, the cap can bear upon the break off tab seal either causing its premature removal or exerting sufficient pressure to cause the relatively delicate elongated tip portion to crack. In either instance, the contents of the bottle is subject to spillage and contamination.

GENERAL DESCRIPTION OF THE INVENTION

It has now been found that the disadvantages and short comings of these screw on cap systems are overcome by the bottle and cap closure system of this invention. In general, the bottle and cap closure system of the invention comprises a set of spaced lugs or cams formed on the inner circumferential surface of the cap and a set of lugs or cams formed on the outer circumferential surface of the neck of the bottle. The lower portion of the cap beneath its lugs or cams is in the form of a tear away band whose lower circumferential edge terminates in an inwardly protruding snap bead. Sufficient distance is provided between the inner surface of the top of the cap and the snap bead so that when the cap is secured to the bottle, the top of the cap does not contact the break off tab seal.

During assembly, a bottle is positioned beneath a cap applying apparatus that lowers the cap over the break off tab seal and the elongated tip portion until the snap bead engages the lugs or cams on the neck of the bottle. The lower end of the neck of the bottle is provided with a circumferential shoulder to arrest the downward movement of the cap thereby preventing the top of the cap from contacting the break off tab seal. In this way, the break off tab seal and the elongated tip of the bottle are completely protected from accidental breakage and the contents of the bottle remain securely sealed, free from spillage or contamination, until ready for use.

When the contents of the bottle are ready to be used, the tear away band is removed, the bottle is uncapped, the break off tab seal is broken off and the contents of the bottle dispensed through the elongated tip portion. The cap is then resecured to the bottle by manually placing the cap over the elongated tip portion and manually exerting slight downward turning pressure on the cap until the lugs or cams in the cap securely engage the lugs or cams on the neck of the bottle.

DETAILED DESCRIPTION OF THE INVENTION

The novel bottle and cap closure system of the invention will become more clear from the ensuing description when considered together with the accompanying drawing wherein like reference numerals denote like parts and wherein:

FIG. **1** is a front elevation of the bottle and cap closure system of the invention shown with a dropper bottle;

FIG. **2** is a front elevation view of a typical prior art dropper bottle and cap with the cap shown in cross section for clarity;

FIG. **3** is a front elevation of the bottle and the cap closure system of the invention with the cap shown in cross section for clarity; and,

FIG. **4** is a view similar to that of FIG. **3** illustrating another embodiment of the bottle and cap closure system of the invention.

As shown in FIG. **2**, a typical, commercial dropper bottle and cap comprises a cap, generally identified at **10**, and a bottle, generally shown at **11**, which contains the material or liquid to be dispensed from the bottle.

The upper configuration of bottle **11** generally has a tapered neck portion **12** extending upwardly from a shoulder **13** at the upper end of the body of the bottle. Extending upwardly from tapered neck portion **12** is an elongation tip portion **14** which terminates at its upper end with a break off tab seal **15**. Break off tab seal **15** is conventionally manufactured to have a geometric cross section in the form of a square, rectangular, hexagonal, and the like.

The lower portion of tapered neck portion **12** carries circumferential, helically wound continuous threads **16** which mate with circumferential, helically wound threads **17** provided on the inner surface of cap **10**.

A wrench well **18** is recessed in the top of cap **10** and is formed to have the same geometric configuration as break off tab seal **15**.

During manufacture and assembly, bottle **11** is filled with the material or liquid to be dispensed therefrom and break off tab seal **15** is bonded to the top of the elongated tip **14** to hermistatically seal the bottle and protect its contents from spilling out. Tab seal **15** also protects the bottle contents from becoming contaminated, particularly when the bottle contains medicine which must be kept in a sterile state until use. Cap **10** is then secured to bottle **11** by screwing threads **17** onto threads **16** by means of an automatic cap applying apparatus.

As mentioned earlier, the torque of the cap applying apparatus must be closely controlled. If too much torque is imparted to the cap applying apparatus, it will tend to screw cap **10** too far down onto tapered neck portion **12** frequently causing the inner surface of cap **10** to bear upon break off seal tab **15**. When this occurs, seal tab **15** can either be completely or partially broken off of tip **14** or tip portion **14** can become cracked

thereby exposing the contents of bottle **11** to air contamination thus compromising the sterility of the bottle contents and/or permitting the bottle contents to leak out during subsequent handling.

If too little torque is imparted to the cap applying apparatus, the cap **10** will have tendency to become unscrewed during subsequent handling thereby exposing tab seal **15** to the possibility of being prematurely broken off.

When these prior art bottles are properly assembled, the bottle contents can be removed by manually unscrewing cap **10** and inverting it to mate wrench well **18** over tab seal **15** and then snapping tab seal **15** off by rotating cap **10** toward the body of bottle **11**. The contents of bottle **11** can then be dispensed by inverting bottle **11** and permitting its contents to flow through the elongated tip portion **14**.

As shown in FIGS. **1** and **3**, the bottle and cap closure system of the invention comprises a cap, generally indicated at **19**, having a circumferential tear away band **20** at its open lower end, a circumferential score **21** where band **20** meets the main part of cap **19**, and an outwardly protruding pull tab **22** formed integrally with tear away band **20** to facilitate removal of the band from the bottom portion of the cap **19**. Cap **19** with band **20**, score **21** and pull tab **22** are molded as a unitary article.

A plurality of circumferentially spaced, outwardly protruding lugs or cams **23** are provided on the surface of tapered neck **12** spaced upwardly from shoulder **13** a sufficient distance to frictionally engage and secure inwardly protruding, circumferential snap bead **24** formed at the open, lower edge of cap **19**. In the cap **19**, a plurality of circumferentially spaced, inwardly protruding lugs or cams **25** are provided upwardly from snap bead **24** and above score **21**; i.e., intermediate the upper end of the tear away band **20** and the top of the cap.

Inwardly protruding lugs or cams **25** are positioned above score **21** a sufficient distance such that when tear away band **20** is removed, lugs or cams **25** can frictionally engage and be secured by and beneath outwardly protruding lugs or cams **23** on the tapered neck **12** of bottle **11**.

In the embodiment shown in FIG. **4**, a wrench well **18** has not been provided in top of the cap **26** and the top portion of bottle **11** is formed to have a substantially uniform, cylindrical neck portion **27** instead of a tapered neck portion **12**, tip **14** and tab seal **15**. In this embodiment, the open top **28** of the bottle **11** can be sealed by any suitable means such as a peelably removable foil **29**.

During assembly of the bottle and cap closure system of the invention (FIGS. **1** and **3**), bottle **11** is stationed beneath a cap applying apparatus which places cap **19** onto bottle **11** under sufficient downward pressure until snap bead **24** engages the lower edges of outwardly protruding lugs or cams **23** with the lower end of cap **19** sitting on or closely spaced from the upper edge of shoulder **13** thereby securely locking cap **19** to bottle **11**. Thus, no torque adjustment needs to be made to the cap applying apparatus to avoid screwing the cap on too tightly or too loosely. Instead, the cap applying apparatus uses a conventional piston operation whose downstroke can be readily controlled and pre-set to snap the cap onto the bottle. In addition, shoulder **13** serves to arrest the downward movement of cap **19** so that the top of the cap is prevented from contacting tab seal **15**.

When the bottle contents are ready to be used, tear away band **20** can be readily removed by manually grasping pull tab **22** and cleanly tearing band **20** off of the cap **19** which is facilitated by score **20**. Where the bottle is of the type shown in FIG. **3**, the bottle can be opened by removing the tab seal **15** using the wrench well **18** at the top of the cap as described above. Where the bottle is of the type shown in FIG. **4**, the bottle can be opened by removing the top seal; in this instance, peelably removing the foil **29**.

In either embodiment, the cap **19** can be resecured to the bottle by placing the cap **19** over the top of the bottle and manually pushing down on and turning the cap **19** until inwardly protruding lugs or cams **25** engage and are secured by the lower edges of outwardly protruding lugs or cams **23** to securely lock the cap **19** to the bottle **11**.

Although the bottle and cap closure system of the invention has been described with respect to bottles and caps having generally circular cross sections, it should be understood that the invention closure system is equally applicable to bottles and caps having other cross section configurations such as square, rectangular, polygonal, elliptical, oval, and the like.

What is claimed is:

1. A bottle and cap closure system comprising:

(a) a bottle body having a lower portion and an upper portion;

(b) a plurality of circumferentially spaced, outwardly protruding lugs or cams intermediate the length of said upper portion;

(c) a cap capable of being closely fitted over said upper body bottle portion;

(d) a circumferential tear away band at the lower open end of said cap having an integrally formed circumferential, inwardly protruding bead at its lower edge; and,

(e) a plurality of circumferentially spaced, inwardly protruding lugs or cams intermediate the upper end of said tear away band and the top of said cap

such that when said cap is placed upon said bottle, said bead engages said outwardly protruding lugs or cams on the upper portion of said bottle to secure said cap to said bottle and when said tear away band is removed from said cap, said inwardly protruding lugs or cams on said cap engage said outwardly protruding lugs or cams on the upper portion of said bottle to secure said cap to said bottle.

2. The bottle and cap closure system of claim **1** wherein said upper bottle portion is in the form of an upwardly extending tapered neck having an elongated tip extending upwardly from said tapered neck and a break off tab seal at the upper end of said elongated tip.

3. The bottle and cap closure system of claim **1** wherein said tear away band carries an outwardly protruding pull tab integrally formed therewith to facilitate removal of said tear away band from said cap and removal of said cap from said bottle.

4. The bottle and cap closure system of claim **2** wherein said cap contains a recessed wrench well in its top, said wrench well and said tab seal having substantially the same geometric configuration such that said wrench well can closely engage said tab seal to facilitate removal of said tab seal.

5. The bottle and cap closure system of claim **3** wherein a circumferential score is formed at the juncture of the upper end of said tear away band and the body of said cap.

6. A bottle and cap closure system comprising:

(a) a bottle body having a lower portion and an upper portion, said upper portion being in the form of an upwardly extending tapered neck having an elongated tip extending upwardly from said tapered neck and a break off tab seal at the upper end of said elongated tip;

(b) a plurality of circumferentially spaced, outwardly protruding lugs or cams intermediate the length of said tapered neck;

(c) a cap having a closed upper end and an open lower end;

(d) a circumferential tear away band at the open, lower end of said cap, said tear away band carrying an outwardly protruding pull tab integrally formed therewith to facilitate removal of said tear away band from said cap and an integrally formed, circumferential, inwardly protruding bead at the open, lower edge of said tear away band; and,

(e) a plurality of circumferentially spaced, inwardly protruding lugs or cams intermediate the upper end of said tear away band and the top of said cap

such that when said cap is placed upon said bottle, said bead engages said outwardly protruding lugs or cams on said tapered neck to secure said cap to said bottle and when said tear away band is removed from said cap, said inwardly protruding lugs or cams in said cap engage said outwardly protruding lugs or cams on said tapered neck to secure said cap to said bottle.

7. The bottle and cap closure system of claim 6 wherein said cap has a wrench well recessed in its outer closed top, said wrench well and said tab seal having substantially the same geometric configuration such that said wrench well can closely engage said tab seal to facilitate removal of said tab seal.

8. The bottle and cap closure system of claim 6 wherein a circumferential score is formed at the juncture of the upper end of said tear away band and the body of said cap to further facilitate removal of said tear away band from said cap.

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